

CLAIMS

What is claimed is:

1           1.     An optical scanner apparatus, comprising:  
2           an optical scanning device configured to reflect a received light beam  
3 towards a photoconductor;  
4           a beam direction system optically coupled to the optical scanning device  
5 and comprising plurality of reflectors, each reflector configured to transmit light  
6 of one polarization while reflecting light of another polarization; and  
7           wherein the reflectors are individually configured to permit passage of one  
8 of an input light beam provided by an external source and a light beam reflected  
9 by the scanning device and to reflect another light beam reflected by the  
10 scanning device.

1           2.     The apparatus of claim 1, wherein individual ones of reflectors  
2 comprise a polarization beam splitter coating configured to cause a light beam  
3 from the scanning device to be either reflected by the individual one of the  
4 reflectors towards another of the reflectors or transmitted through the individual  
5 one of the reflectors towards the photoconductor.

1           3.     The apparatus of claim 1, wherein individual ones of the reflectors  
2 comprise a beam splitter coating configured to pass light of a first polarization  
3 direction and reflect light having a polarization direction opposite to the first  
4 polarization direction.

1           4.     The apparatus of claim 1, further comprising:  
2           a first optical device disposed between the beam direction system and the  
3 optical scanning device, the first optical device configured to convert a first type  
4 of polarized light into a second type of polarized light to cause a light beam  
5 reflected by the scanning device to be reflected upon encountering a first  
6 reflector among the plurality of reflectors.

1           5.     The apparatus of claim 4, wherein the first type comprises linearly  
2 polarized light and the second type comprises circularly polarized light.

1           6.     The apparatus of claim 4, wherein the first optical device  
2 comprises a quarter waveplate oriented at an angle of 45 degrees with respect  
3 to an entering polarization direction of a light beam.

1           7.     The apparatus of claim 4, further comprising:  
2           a second optical device disposed between the beam direction system and  
3 the first optical device to reduce stray light components from passing  
4 therethrough.

1           8.     The apparatus of claim 1, wherein the scanning device is  
2 configured to convert right circular polarization of a light beam received by the  
3 scanning device into left circular polarization to cause reflection of the light  
4 beam upon encountering an individual reflector among the plurality of reflectors.

1           9.     The apparatus of claim 8, wherein the second optical device is  
2 configured to rotate a polarization of a light beam reflected by the scanning  
3 device and passing through the second optical device towards the  
4 photoconductor in order to rectify misalignment of a polarization direction of the  
5 light beam passing through the second optical device.

1           10.    The apparatus of claim 8, wherein the second optical device  
2 comprises a compensator oriented at an angle of 0 degrees with respect to an  
3 entering polarization direction of a light beam.

1           11.    The apparatus of claim 1, wherein each reflector comprises a  
2 prism.

1           12.    The apparatus of claim 1, wherein each reflector comprises a pair  
2 of glass plates arranged at an angle of 90 degrees with respect to each other  
3 and at an angle of 45 degrees with respect to an input light beam.

1           13. The apparatus of claim 1, wherein the optical scanning device  
2 comprises a rotating polygon mirror.

1           14. The apparatus of claim 1, wherein one of the reflectors is  
2 configured to permit passage of the input light beam before being reflected using  
3 the scanning device.

1           15. An optical scanner apparatus, comprising:  
2 a scanning device configured to reflect an input light beam from an  
3 external light source as an output light beam towards a photoconductor; and  
4 a beam direction system configured to rectify scanning errors, and  
5 wherein the beam direction system is disposed between the light source and the  
6 scanning device to permit passage of both the input light beam and the  
7 corresponding output light beam reflected by the scanning device towards the  
8 photoconductor.

1           16. The apparatus of claim 15, further comprising:  
2 a first optical device disposed between the beam direction system and the  
3 scanning device, the first optical device configured to convert linearly polarized  
4 light into circularly polarized light to cause a light beam scanned by the scanning  
5 device to be reflected upon encountering the beam direction system.

1           17. The apparatus of claim 16, wherein the beam direction system  
2 comprises a plurality of reflectors individually configured to permit passage of  
3 light of a first polarization direction while reflecting light having a polarization  
4 direction opposite to the first polarization direction.

1           18. The apparatus of claim 16, further comprising:  
2 a second optical device disposed between the beam direction system and  
3 the first optical device, and wherein the second optical device is configured to  
4 rotate a polarization of a light beam reflected by the scanning device and  
5 passing through the second optical device in order to correct misalignment of a

6 polarization direction of the light beam passing through the second optical  
7 device.

1 19. The apparatus of claim 18, wherein the second optical device  
2 comprises a compensator oriented at an angle of 0 degrees with respect to an  
3 entering polarization direction of a light beam.

1 20. A hard imaging device, comprising:  
2 emission means for emitting an input light beam;  
3 scanning means comprising a plurality of reflector means individually  
4 comprising means for transmitting light of one polarization while reflecting light  
5 of another polarization different than the one polarization;  
6 photoconductor means for receiving an output light beam scanned by the  
7 scanning means; and  
8 wherein the reflector means further individually comprise means for  
9 permitting passage of one of the input light beam and the output light beam and  
10 for reflecting another light beam reflected by the scanning means in a direction  
11 towards the photoconductor means.

1 21. A hard imaging device, comprising:  
2 a light source for emitting an input light beam towards a scanning device;  
3 a photoconductor configured to receive a light beam scanned by the  
4 scanning device; and  
5 an optical scanner apparatus, comprising:  
6 a beam direction system optically coupled to the scanning device  
7 and comprising a plurality of reflectors, each reflector configured to transmit  
8 light of one polarization while reflecting light of another polarization different  
9 than the one polarization; and  
10 wherein the reflectors are individually configured to permit passage  
11 of one of the input light beam and the light beam reflected by the scanning  
12 device and to reflect another light beam reflected by the scanning device  
13 towards the photoconductor.

1           22. The device of claim 21, wherein the optical scanner apparatus  
2 further comprises:

3           a first optical device disposed between the beam direction system and the  
4 scanning device, the first optical device configured to convert linearly polarized  
5 light into circularly polarized light to cause the light beam scanned by the  
6 scanning device to be reflected upon encountering a first reflector among the  
7 plurality of reflectors.

1           23. The device of claim 22, wherein the optical scanner apparatus  
2 further comprises:

3           a second optical device disposed between the beam direction system and  
4 the first optical device, and wherein the second optical device is configured to  
5 correct misalignment of a polarization direction of a light beam passing through  
6 the second optical device.

1           24. An optical scanning method, comprising:

2           first receiving an input light beam by a scanning device;

3           first reflecting the input light beam towards a first reflector using the  
4 scanning device;

5           second receiving a light beam reflected by the scanning device by the first  
6 reflector;

7           first redirecting the light beam received by the first reflector towards a  
8 second reflector;

9           second redirecting the light beam received by the second reflector  
10 towards the scanning device to increase a scan angle of the light beam; and

11           second reflecting the light beam redirected by the second reflector onto a  
12 photoconductor using the scanning device.

1           25. The method of claim 24, further comprising:

2           passing the input light beam through the first reflector before the first  
3 receiving; and

4            passing the light beam output from the first reflector through a first  
5            optical device.

1            26.    The method of claim 25, further comprising converting light of a  
2            first polarization type to light of a second polarization type using the first optical  
3            device.

1            27.    The method of claim 25, further comprising:  
2            arranging the first optical device comprising a quarter waveplate at an  
3            angle of 45 degrees with respect to an incoming polarization direction in order to  
4            reflect a light beam reflected by the scanning device towards the second  
5            reflector.

1            28.    The method of claim 27, further comprising:  
2            arranging a second optical device comprising a compensator at an angle  
3            of 0 degrees with respect to an incoming polarization direction to rectify  
4            misalignment of a light beam passing through the second optical device.

1            29.    The method of claim 24, wherein the second receiving further  
2            comprises:  
3            receiving the light beam reflected by the scanning device by a first optical  
4            device to convert circularly polarized light of the light beam reflected by the  
5            scanning device to linearly polarized light;  
6            receiving the light beam output from the first optical device by a second  
7            optical device to rectify misalignment of the light beam passing through the  
8            second optical device; and  
9            receiving the light beam output from the second optical device by the first  
10           reflector for reflecting towards the second reflector.

1            30.    The method of claim 24, further comprising passing the input light  
2            beam through the first reflector and first and second optical devices before the  
3            first reflecting.

1           31. The method of claim 24, further comprising:  
2           individually configuring the first and second reflectors to permit passage  
3 of one of the input light beam and the light beam reflected by the scanning  
4 device and to reflect another light beam reflected by the scanning device.

1           32. A hard imaging scanning method comprising:  
2           first providing a rotating reflection device;  
3           second providing first and second reflectors;  
4           third providing light to the reflection device; and  
5           directing the light to a photoconductor using the reflection device, the  
6 directing comprising first reflecting the light using the reflection device,  
7 redirecting the light reflected from the reflection device to the reflection device  
8 using the first reflector and the second reflector, and second reflecting the  
9 redirected light to the photoconductor using the reflection device, and wherein  
10 the third providing comprises passing the light through the first reflector prior to  
11 reflection of the light using the reflection device.

1           33. The method of claim 32, wherein the first and second reflectors  
2 comprise an optical circulator.

1           34. The method of claim 32, wherein:  
2           the directing further comprises converting circularly polarized light to  
3 linearly polarized light after the first reflecting of the light by the reflection  
4 device; and  
5           the redirecting comprises converting the linearly polarized light to  
6 circularly polarized light that is orthogonal to a polarization state of the light in  
7 the third providing.

1           35. The method of claim 32, wherein the providing the first and  
2 second reflectors comprise providing reflectors individually configured to permit  
3 passage of light of a first polarization direction while reflecting light having a  
4 polarization direction opposite to the first polarization direction.